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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/008,565	11/13/2001	Peter F. Corbett	112056-0015	6718
24267	7590	04/08/2004	EXAMINER	
CESARI AND MCKENNA, LLP			THAI, HANH B	
88 BLACK FALCON AVENUE			ART UNIT	
BOSTON, MA 02210			PAPER NUMBER	

2171

DATE MAILED: 04/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/008,565

Applicant(s)

CORBETT, PETER F.

Examiner

Hanh B Thai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2,3 & 4.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

This is in response to application filed November 13, 2001 in which claims 1-22 are presented for examination.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-6 and 8-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Lubbers et al. (US Patent no. 5,390,327).

Regarding claim 1, Lubbers discloses a method for enabling parity declustering in a balanced parity array of a storage system, the method comprising the steps of:

- combining a plurality of unbalanced stripe arrays to form the balanced array, each unbalanced stripe array having parity blocks on a set of storage devices that are disjoint from a set of storage devices storing data blocks (see Summary; col.6, lines 4-11; and col. 21, line 52 to col. 2, line 14, Lubbers).
- distributing assignment of storage devices to parity groups throughout the balanced array (see col. 5, lines 17-46, Lubbers).

Regarding claim 2, Lubbers further discloses the step of, after a single or double storage device failure, ensuring that all surviving data storage devices are loaded uniformly during reconstruction of the failed storage device or devices (see col. 3, lines 18-27 and col.5, line 17 to col. 6, line 3, Lubbers).

Regarding claim 3, Lubbers does not disclose that the storage system is a filer. But, Lubbers discloses a storage system that contains the data blocks and array (see abstract of Lubbers) that corresponds to the filer.

Regarding claim 4, Lubbers further discloses the steps of dividing each storage device into blocks; and organizing the blocks into stripes across the devices, wherein each stripe contains data and parity blocks from each of the devices of the balanced array (see Fig.2 and corresponding text, Lubbers). Please note that “storage device” corresponds to the “disk”.

Regarding claim 5, Lubbers further discloses the step of selecting patterns of characters representing data storage devices of a stripe to thereby change the association of the data storage devices with parity groups from stripe to stripe of the balanced array (see col. 5, lines 17-46, Lubbers).

Regarding claim 6, Lubbers further discloses that the characters are binary numbers (see col. 9, lines 44-46 and col.10, lines43-47, Lubbers).

Regarding claim 8, Lubbers further discloses the steps of configuring the balanced array as a RAID-4 style array (see col. 9, lines10-26 and col.21, line 65 to col. 22, line 7, Lubbers); initially under-populating the array with storage devices; and adding storage devices until a fully populated array of predetermined size is achieved (see fig.5-6 and corresponding text, Lubbers).

Regarding claim 9, Lubbers further discloses that the storage devices are disks (see col. 5, lines 17-19, Lubbers).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 10-11, 12, 14, 17-18 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lubbers et al. (US Patent no. 5,390,327) in view of Wilkes et al. (US Patent no. 5,720,025).

Regarding claim 10, A system that enables parity declustering in a balanced parity array of a storage system, the system comprising:

- a plurality of storage devices, each storage device divided into blocks that are further organized into stripes, wherein each stripe contains data and parity blocks from each of the devices of the balanced array (see Fig. 1-2 and corresponding text, Lubbers). Fig. 1 of Lubbers showing the plurality of storage disk drives which corresponds to the storage devices and each storage device is divided into blocks and organized into strips as showed in Fig. 2 of Lubbers;
- a storage operating system (10, Fig. 1, Lubbers) including a storage layer configured to implement a parity assignment technique that distributes assignment of devices to parity groups throughout the balanced array (see col. 5, lines 17-38, Lubbers). Please note that “storage system 10” corresponds to the “storage operating system”; and
- a processing element configured to execute the operating system to thereby invoke storage access operations to and from the balanced array in accordance with the concentrated parity technique (see Fig. 1 and col. 5, lines 17-38,

Lubbers). Please note that “a processing element” corresponds to the “CPU” (18, Fig.1, Lubbers).

Lubbers, however, does not disclose that “all storage devices contain the same amount of data or parity information”. Wilkes discloses a method and apparatus for frequently-redundant array of independent disks that the storage space of disk drives is organized into a set of sequentially numbered blocks on each disk drive and each block of data is equal to the same amount of information stored on a disk (see col.5, line 66 to col.6, line 14, Wilkes). Therefore, Wilkes read on the claimed limitation. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lubbers to include a plurality of storage devices that each one stored the same amount of data as taught by Wilkes. The motivation of doing so would have been to reduce the access time necessary to update data stored on an array of disks (see col. 4, lines 42-44, Wilkes).

Regarding claim 11, Lubbers/Wilkes discloses the storage layer further combines a plurality of unbalanced stripe arrays to form the balanced array, each unbalanced stripe array having parity blocks on a set of storage devices that are disjoint from a set of storage devices storing data blocks (see col.6, lines 4-11; and col. 21, line 52 to col. 2, line 14, Lubbers).

Regarding claim 12, Lubbers/Wilkes discloses the storage devices are disks and wherein the storage layer is a RAID layer (see col.8, lines 36-47, Lubbers). RAID level corresponds to the RAID layer.

Regarding claim 14, Lubbers/Wilkes discloses the storage system is a network-attached storage appliance (see Fig.1 and corresponding text, Wilkes).

Regarding claims 17 and 20, lubbers discloses an apparatus for enabling parity declustering in a balanced parity array of a storage system, the apparatus comprising:

- means for combining a plurality of unbalanced stripe arrays to form the balanced array, each unbalanced stripe array having parity blocks on a set of storage devices that are disjoint from a set of storage devices storing data blocks (see Summary; col.6, lines 4-11; and col. 21, line 52 to col. 2, line 14, Lubbers); and
- means for distributing assignment of devices to parity groups throughout the balanced array such that all storage devices (see col. 5, lines 17-46, Lubbers).

Lubbers, however, does not disclose that “all storage devices contain the same amount of data or parity information”. Wilkes discloses a method and apparatus for frequently-redundant array of independent disks that the storage space of disk drives is organized into a set of sequentially numbered blocks on each disk drive and each block of data is equal to the same amount of information stored on a disk (see col.5, line 66 to col.6, line 14, Wilkes). Therefore, Wilkes read on the claimed limitation. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lubbers to include a plurality of storage devices that each one stored the same amount of data as taught by Wilkes. The motivation of doing so would have been to reduce the access time necessary to update data stored on an array of disks (see col. 4, lines 42-44, Wilkes).

Regarding claims 18 and 21, Lubbers/Wilkes combination further discloses means for dividing each storage device into blocks; and means for organizing the blocks into stripes across the devices, wherein each stripe contains data and parity blocks from each of the devices of the

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balanced array (see Fig.1-3 and corresponding text and col. 21, line 52 to col. 2, line 14, Lubbers).

3. Claims 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lubbers et al. (US Patent no. 5,390,327) in view of Karr (US Patent no. 3,993,862).

Regarding claim 7, Lubbers discloses all of the claimed limitation as discussed above, except “the characters are ternary numbers.” Karr, however, discloses a system for compressing source data whereat the characters is ternary numbers (see col.4, lines 4-63, Karr). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lubbers including the claimed feature as taught by Karr. The motivation of doing so would have been to increase the performance through load balancing (see col. 1, lines 41-49, Lubbers).

Regarding claim 13, Lubbers/Karr discloses the RAID layer is implemented in logic circuitry (see Fig.3-5 and corresponding text, Karr).

4. Claims 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lubbers et al. (US Patent no. 5,390,327) in view of Wilkes et al. (US Patent no. 5,720,025) and further view of Milligan et al. (US patent no. 6,546,458).

Regarding claims 19 and 22, Lubbers/Wilkes combination discloses all of the claimed limitation as discussed above, except “the selecting patterns of characters representing data storage devices of a stripe”. Karr, however, discloses a system for compressing source data including the selecting patterns of characters (see col. col.4, lines 4-63, Karr). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Lubbers/Wilkes to include patterns of characters as taught by Karr. The motivation of doing so would have been

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to reduce the access time necessary to update data stored on an array of disks (see col. 4, lines 42-44, Wilkes).

5. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lubbers et al. (US Patent no. 5,390,327) in view of Wilkes et al. (US Patent no. 5,720,025) and further view of Milligan et al. (US patent no. 6,546,458).

Regarding claim 15, Lubbers/Milkes discloses all of the claimed limitation as discussed above, except "the storage devices are one of video tape, optical, DVD, magnetic tape and bubble memory devices". But it is well known that any type of storage device would be videotape, optical, DVD, magnetic tape as evidence by Milligan (see col.4, lines 9-27, Milligan). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Lubbers and Milkes to include the claim feature that the storage devices are one of video tape, optical, DVD, magnetic tape as taught by Milligan. The motivation of doing so would have been to reduce the access time necessary to update data stored on an array of disks (see col. 4, lines 42-44, Wilkes).

Regarding claim 16, lubbers/Milkes/Milligan combination further discloses the storage devices are media adapted to store in formation contained within the data and parity blocks (see col. 12, lines 26-42, Milligan).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. Debiez et al. (US Patent no. 6,529,997) discloses a apparatus and method for writing and reading data to and from a virtual volume of redundant storage devices.

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2. Chen et al. (US Patent no. 6,513,093) discloses a high reliability, high performance disk array storage system.

3. Callison et al. (US Patent no. 6,370,616) discloses a memory interface controller for datum RAID operations with a datum multiplier.

4. Baylor et al. (US Patent no. 5,634,096) disclose a scheme for storing data on disks.

5. Ozden et al. (US Patent no. 6,079,028) discloses a fault tolerant architectures for continuous media servers.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh B Thai whose telephone number is 703-305-4883. The examiner can normally be reached on 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Safet Metjahic can be reached on 703-308-1436. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Hanh Thai *HT*
Art Unit 2171
April 1, 2004


SAFET METJAHIC
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100